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NEWS RELEASE

Feb. 14, 2005

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UM SCIENTIST TO STUDY EDGE OF SOLAR SYSTEM

MISSOULA—

Somewhere out there, way out there -- at a point 100 times farther from the Sun than Earth -- the solar wind slows down and merges with interstellar space.

This area, the termination shock, marks the ultimate edge of the solar system. And University of Montana scientist Dan Reisenfeld is helping NASA design a research satellite to map this remote region.

"There is a boundary between our neighborhood and the rest of the universe, and we want to understand that boundary," Reisenfeld said. "It's where the influence of the Sun ends and the true void of space begins."

NASA recently approved funding for the Interstellar Boundary Explorer (IBEX). The mission has a price tag of about $134 million, and the satellite is scheduled to launch sometime in 2008.

Reisenfeld, a UM professor of astronomy and physics, was part of a four-member team at Los Alamos National Laboratory in New Mexico and Southwest Research Institute in Texas that designed a prototype for one of two instruments that will fly aboard IBEX.

Now this team, led by Dave McComas of Southwest Research Institute, will design IBEX-Hi -- an instrument that uses a large-aperture camera to detect high-energy particles

-more-

coming from the edge of the solar system. A second instrument, IBEX-Lo, will hunt low-energy particles.

Contrary to popular belief, space isn't totally empty. Reisenfeld said the blackness between stars contains gas and dust called the interstellar medium. As our solar system moves through this medium, the solar wind from the Sun carves a bubble of sorts.

"The solar wind bubble is like a rock in a stream," he said. "As water flows around a rock, it kind of piles up in front, making a wave crest. Gas in the interstellar medium piles up on the leading edge of the solar wind bubble. That's the termination shock."

So, how do you detect a nearly invisible wave crest well beyond the orbit of Pluto? Reisenfeld said the spacecraft will image neutral atoms of a specific energy. These signature atoms indicate scattering at the edge of the termination shock, allowing scientists to see the boundary and map it.

"Our instrument takes a picture very quickly of each little segment of space it sees," he said. "As it sweeps, it builds up a whole sky image of the entire volume around the spacecraft."

To detect the signature particles, the IBEX-Hi instrument will convert the neutral atoms into ions. This involves passing the atoms through an extremely thin carbon foil only 50 atoms thick. Resembling smoked sunglasses, these delicate foils have flown in space before; but for IBEX they need to design the largest ever used -- as big as a pie tin or bunt pan.

"You can't touch them, they are so fragile," he said. "In the manufacturing process we adhere them to a wire grid to give them some physical strength."

Reisenfeld joined the UM faculty last summer, and the UM lab he is creating will

actively assist with design of the IBEX-Hi instrument. "Hopefully I will be able to involve our undergraduate students and do some of the foil research here. I also might need to hire a postdoc to help out. I think we can investigate certain aspects of the design in great detail here, and the engineering will happen at Los Alamos. And we can do a lot of modeling for the project here on computer."

IBEX will use a highly elliptical orbit that takes it beyond the interference of the Earth's magnetosphere as it maps the termination shock. The satellite also will study galactic cosmic rays -- energetic particles from beyond the solar system that pose a health risk for humans exploring beyond Earth's orbit.

"This is something we've been working on for five years," Reisenfeld said. "This is studying the unknown purely for the sake of learning something new. It's exciting that we finally have approval."

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